Luminescence and slow magnetic relaxation in Dy-Fe(CN)$_5$NO dinuclear complex.

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Single-molecule magnets (SMMs), showing slow magnetic relaxation stemming from large magnetic anisotropy of metal centers or clusters, are attractive for their application toward information storages and quantum computers. Lanthanide ions exhibiting luminescence and large magnetic anisotropy make it possible to realize luminescent SMMs, which explore multifunctional molecule magnets.[1] Switchable molecule magnets are also drawing attention, and $[M(CN)_5NO]^{n-}$ are promising candidate in that they show photoisomerization of the NO ligand.[2] In this context, we aimed at the synthesis of SMMs combined with lanthanide ions and diamagnetic $[Fe(CN)_5NO]^{2-}$ to realize switchable luminescent SMMs by photo irradiation. Herein, we present Dy-Fe dinuclear complex, $\{[Dy(2\text{-pyridone})_4(H_2O)_3][Fe(CN)_5NO]Cl\}\cdot H_2O$ (**DyFe**) (Figure 1a), which exhibits luminescence and field-induced slow magnetic relaxation.

DyFe was obtained by mixing two aqueous solutions; one containing $DyCl_3\cdot 6H_2O$ and 2-pyridone, and the other containing $Na_2[Fe(CN)_5NO]Cl\}\cdot 2H_2O$. Single crystal X-ray diffraction analysis revealed that the crystal system and space group of **1** were monoclinic and $P2_1/n$. **DyFe** showed a broad blue emission peak and three sharp emission peaks when irradiated with 320 nm light, assigned to π^*-π transition of 2-pyridone and f-f transition of Dy^{3+} respectively. Alternate current magnetic measurement confirmed slow magnetic relaxation of **DyFe** under a direct current magnetic field of 1000 Oe below 5 K (Figure 1b).

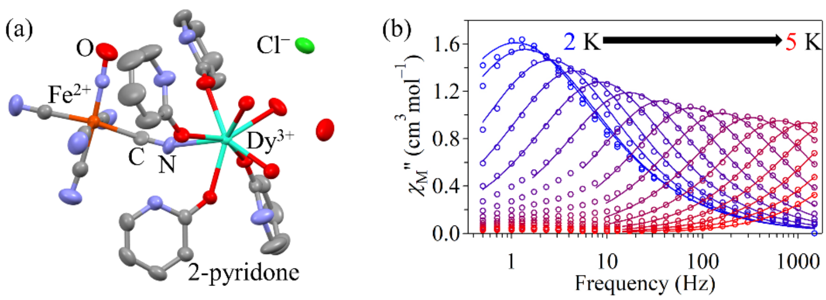

Figure 1. (a) Crystal structure of **DyFe**. (b) Frequency dependence of χ_M'' below 5 K.

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